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BERMUDA

DEPARTMENT OF AGRICULTURE

REPORT

of the

Plant Pathologist

for the year

1945

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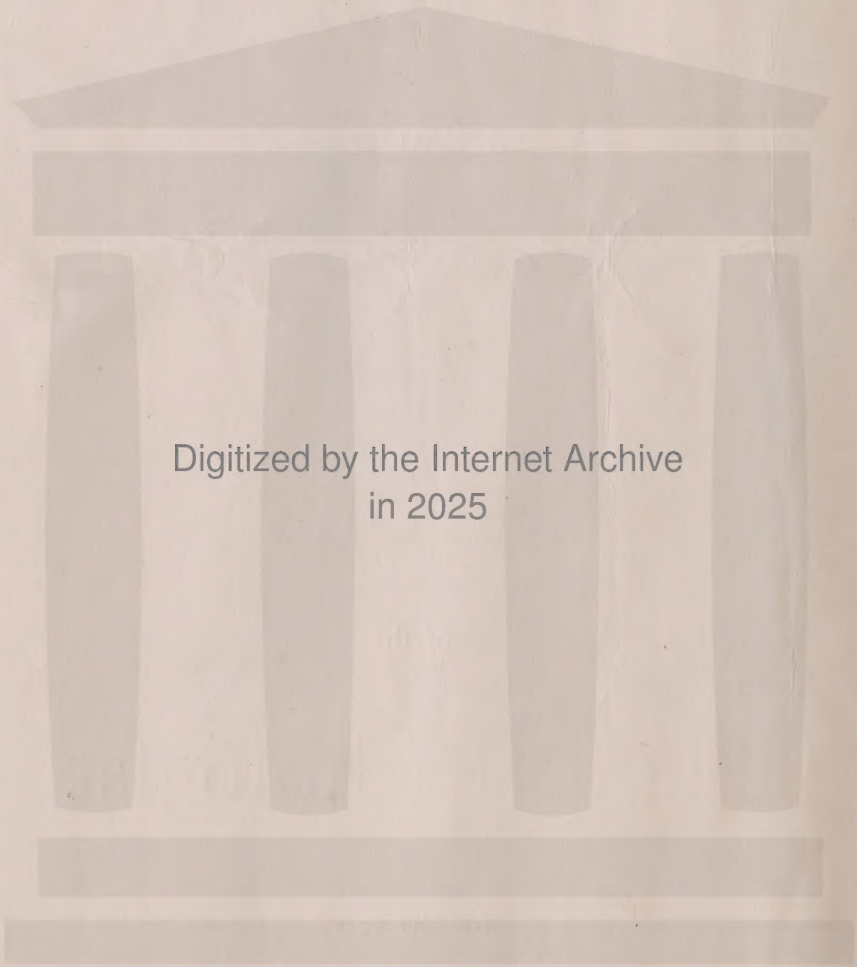

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REPORT OF THE PLANT PATHOLOGIST, 1945

The Director of Agriculture:

I have the honour to submit a report on work done on plant diseases and pests during the year 1945.

GENERAL REVIEW

The weather during the period under review was characterised by a hot, dry summer, followed by a wet autumn. One result of the dry summer was an increase in the incidence of insect pests, particularly the potato tuber moth, *Gnorimoschema operculella* Zell., which contributed to storage losses amounting to 29% in the main crop of potatoes as a result of a break-down in the refrigeration plant hired by Government. Part of this loss was caused not only by tuber-moth but also through wastage due to fungi and bacteria. It must be emphasised here, as in previous years, that wastage due to fungi and bacteria cannot be held in check in common storage at the summer temperatures experienced in Bermuda, without an excessive amount of handling which is both expensive and uneconomic. The provision of adequate refrigeration facilities will reduce these losses to a minimum in addition to controlling tuber moth damage at the same time.

Rainfall was heavy during the autumn months and temperatures were rarely below 60° F. As a result, serious damage was caused to Easter lilies, *Lilium longiflorum* var. *eximium* Baker, by *Phytophthora parasitica* Dast., which made an early appearance on October 29th, chiefly on the "Howardii" or early flowering variety. Losses amounted to 30% in some fields. On the other hand, no late blight, *Phytophthora infestans* (Mont.) de Bary, was seen on the autumn planted Triumph and Sebago potato crops, since temperatures remained high. The higher soil temperatures were also reflected in an increase in seedling losses through attack by *Rhizoctonia solani* Kuhn, particularly in the case of tomatoes and cabbage.

The wet autumn favoured bacterial diseases such as black rot of cabbage, *Xanthomonas campestris* (Pamm.) Dowson, and there were cases of fruit splitting in the citrus and tomato crops. Salt water caused an unusual form of injury brought about by abnormally high tides. The roots of cedar trees, bananas and other crops growing in low lying land were affected.

Two new scale insects, both causing serious injury to the native cedar, *Juniperus bermudiana* L., were reported for the first time. Interceptions of serious pests and diseases are recorded under the heading of Inspection Services.

MAJOR PROBLEMS INVESTIGATED

SURVEY OF INSECTS AND PESTS ATTACKING THE BERMUDA CEDAR

A survey of insects and pests attacking the Bermuda cedar brought to light two additional species of scale insects hitherto unrecorded from the Islands which were found to be causing serious injury in two separate localities. These were the Oyster-shell scale, *Lepidosaphes newsteadi* Sulc., and the Juniper scale, *Diaspis visci* Schr. (*D. carueli* Targ.).

The Oyster-shell scale, *L. newsteadi*, was collected for the first time by T. A. Russell at Harrington Sound, December 4th, 1944. The specimens were determined by Dr. Hall of the Imperial Institute of Entomology who stated at the time that it was very unlikely that this species would prove to be the cause of injury to the trees. However, subsequent observations in the field leave little doubt as to the seriousness of the injury caused by the pest on local cedars. The main centre of infestation was found in the region around Castle Harbour Hotel, Tucker's Town, Paynter's Vale and Walsingham. An isolated centre was also found on Frascatti Golf Course at Flatts.

Not all the trees in the above regions were equally attacked by the scale. Observations made over a period of a year on marked trees reveal that lightly infested trees have remained in the same condition, whilst more severely infested trees have died out. This would suggest the existence of "resistant" strains of Bermuda cedar. No evidence of parasites has yet been found, and while these are sought, control through application of oil emulsion sprays will be attempted.

The Juniper scale, *D. visci*, was collected for the first time by W. R. Evans at "Chelston," Paget, on August 27th, 1945, and determined by Dr. Harold Morrison of the Bureau of Entomology & Plant Quarantine, U.S.D.A. Commenting on these specimens, Dr. C. F. W. Muesebeck stated, "It appears to be a widespread species. Occasionally it causes local damage in the United States. Dr. Morrison stated in his report that your samples indicate heavy attack by parasites. If that condition actually exists in the field the infestation might soon become stabilised, with the result that only minor damage would be caused."

The parasites collected at the same station were identified by the Imperial Institute of Entomology as *Aspidiotiphagus citrinus* Craw., a species of wasp already collected in Bermuda on *Chrysomphalus agavis* Ths. & Ckll., on Bermuda Cedar, and on *Comstockiella sabalis* Comst., on the Bermuda Palmetto, *Sabal bermudana* Bailey. This species has been previously recorded as a parasite of *D. visci* from Belgium and Puerto Rico (W. R. Thompson, A Catalogue of the parasites and predators of Insect pests, Sect. 1, part 3, p.42. 1944). Of the two other parasites listed by Dr. Thompson on this host, *Aphytis mytilaspidis* LeB., is known in Bermuda as a parasite of *Comstockiella sabalis* Comst., but has not yet been recovered from the Juniper scale, whilst *Euaphycus botanicus* Mercet, has not been recorded from Bermuda.

Observations to date reveal the distribution of *A. citrinus* to be co-extensive with that of *D. visci*, which can be explained by the fact that the wasp is already well established on *C. agavis*, a widely distributed pest of the Bermuda cedar.

The area affected by the Juniper scale is small compared with that of the Oyster-shell scale and it is too soon yet to predict the seriousness of the infestation. A few of the trees infested have been killed and others have been badly defoliated. The foliage of all the trees within an area of about three acres presents a brown appearance.

There is some evidence that both the above pests have been introduced during recent years on coniferous nursery stock. It is not known how *Lepidosaphes newsteadi* entered Bermuda, but the area of origin is thought to be centered around the Castle Harbour Hotel grounds, Tucker's Town. The junipers in this area are overgrown with *Jasminum gracile* Andrews, which could have acted as a screen, enabling the scale to become established undetected until it reached epizootic proportions.

As far as can be ascertained, *Diaspis visci* was introduced at "Chelston," Paget, on coniferous nursery stock imported from California on December 12th, 1942. As already noted above, no damage to local junipers was observed until a little over 2½ years later. Some concept of the suddenness of the outbreak may be grasped from the fact that two months previously, the area had been inspected by the visiting entomologist, Dr. R. L. Parker (see below) who did not record its presence on the trees.

Reference has been made in previous Annual Reports to mite damage. One species of economic importance has now been identified by Dr. E. W. Baker, U.S.D.A., Bureau of Entomology & Plant Quarantine, as the spruce spider mite, *Paratetranychus ununguis* Jac. This mite is responsible for severe browning and defoliation of the Bermuda cedar, especially during the early spring and summer if weather conditions are hot and dry. An application of a 2% oil emulsion spray ("Citro-mulsion") during the winter months, checked an outbreak of this pest at "Camden," Paget. Thinning and pruning cedars has also proved beneficial in checking the damage caused by the mite.

During the writer's absence from the Colony, the services of Dr. R. L. Parker, Professor of Entomology, Kansas State College, were secured for the purpose of carrying out a survey of the insects attacking the Bermuda cedar. His observations made over the period March 3rd to June 27th (Report on the survey of the Insects and Pests attacking the Bermuda Cedar, 1-5, 1945) in general confirmed the findings of the writer made in previous Annual Reports. Dr. Parker recommended spraying with oil emulsion as a general control measure.

Immediate lines of investigation will test the effectiveness of various spray mixtures in combatting the scale insects, mites and leaf hoppers, *Ormenis infuscata* Stal. A long range research project will embrace selection and propagation of resistant varieties, should these be found, Biological control of pests, and woodland improvement. In connection with the latter, the provision of a Forest Gang, trained to use the proper methods in the care of trees, and maintained at Government expense, would do much to assist in the control of harmful pests and at the same time greatly enhance the appearance of the Colony's landscape. It should be realised, however, that a scheme of this nature will entail a considerable annual Government expenditure, which on the other hand, will be compensated by an increased attractiveness of these Islands' natural beauty.

The work of the Government forest gang performed in 1938 has provided Demonstration Areas which now show what can be accomplished by men properly trained in Sylviculture.

BIOLOGICAL CONTROL OF POTATO TUBER MOTH

An attempt to introduce two parasites of the potato tuber moth was made during the spring months by T. A. Russell through the kind co-operation of Dr. W. R. Thompson and Dr. Wendell F. Sellers of the Imperial Parasite Service, Belleville, Ontario.

The importations arrived by air from The Imperial Parasite Service, Citrus Experiment Station, Riverside, California, over the period March 19th-April 14th, in eighty boxes which were estimated to yield 86,000 adults of *Microbracon gelechiae* and 45,225 adults of *Chelonus phthorimaeae.*

At the time of arrival of the first consignment of parasites no tuber moths were to be seen in the field. They were not found until March 22nd, when larvae were seen mining the foliage of potatoes in a small field in Warwick Parish. The moth was difficult to find until April. By the middle of that month, signs of the larvae in the foliage could be seen in most fields and they were locally abundant at Stephen's Farm, Paget, and in plantings around Smith's Pond in Southampton West. Larvae were found in potato tubers in the latter area on 14th April. They were found less commonly in tomato foliage.

The parasites were shipped in light wooden boxes with a round hole closed by a cork. Shortly after arrival the cork was removed and a glass phial inserted in its place. As soon as 10 to 20 parasites had emerged and were seen in the phial, the box was taken to a suitable field and left uncorked. Nearly all the boxes were placed in fields of potatoes showing tuber moth damage, but a few were also placed in tomato fields where *Psara periusalis* Wlk., occurred, since the presence of this pest indicated that a thorough spraying against insects had not been done, and as a result there was a better chance that the incidence of the potato tuber moth would prove to be greater in these areas.

Specimens of tuber moth larvae will be collected in 1946 to determine whether the above parasites have become established.

MINOR INVESTIGATIONS

TRIAL OF WEED-KILLERS

A new material, the ammonium salt of 2-4 dichlorophenol-acetic acid, 10%, known as "2-4-D," gave successful control of weeds when lightly sprayed on the foliage at the rate of 1 lb. in 12 gallons of water. The following weeds proved susceptible: Morning-glory, *Ipomoea villosa; Oxalis martiana; Ricinus communis, Amaranthus hybridus;* Fennel, *Foeniculum vulgare;* Dandelion, *Taraxacum officinale;* Sow Thistle, *Sonchus oleraceus;* Mustard, *Brassica nigra;* Nettle, *Urtica membranacea*, and *Commelina elegans.*

"Ammate," ammonium sulfamate 80%, was also tested at the rate of 1 lb. in 1 gallon of water per 100 square feet with good results. Neither of these compounds was effective in controlling nut grass, *Cyperus rotundus*, or wild onion, *Nothoscordum fragrans.*

OFFICE WORK

Office work consisted of attending to correspondence and furnishing the local press with seasonable notes on diseases and pests. The following special report was written, "Report of the Plant Pathologist on Work Done during Duty Leave in the United States of America with the purpose of completing a fungous flora of Bermuda, Oct. 22nd, 1944-Oct. 21st, 1945."

ADVISORY WORK

In addition to giving advice on the control of plant diseases and pests, assistance was given the Bermuda Citrus Growers' Association in staging an educational exhibit in Hamilton, December 12th-17th.

WORK DONE ON DUTY LEAVE

The writer was absent from the Colony on Duty Leave in the United States of America over the period October 22nd, 1944, to October 21st, 1945, inclusive, and was stationed at Cornell University, Ithaca, N.Y., with the purpose of completing a fungous flora of Bermuda.

On arrival at Cornell University on October 27th, 1944, it was learned that Professor H. H. Whetzel was seriously ill. However, the writer was able to consult him at his home on various occasions with regard to the course of the work. His death on November 30th, 1944, was a great loss. Fortunately, however, Professor Whetzel was a very systematic worker and left all his notes and herbarium specimens in perfect order, which greatly facilitated the completion of the task.

As a result of these studies, over 750 named species of Bermuda Fungi are now known. This is a very satisfactory figure for so small an area.

Less than half the number of species recorded are parasitic on plants, but the number of diseases affecting crop plants are fewer in Bermuda than in similar regions elsewhere in the world. These and many other aspects of Bermuda's fungous flora are fully discussed in the manuscript the writer has prepared for publication entitled "The Fungi of Bermuda." This contains a complete list of all the fungi previously recorded from the Colony together with a bibliography of over 200 references to mycological and phytopathological work in Bermuda.

Several species of Bermuda Fungi were found to be new to science. These the writer has described with the co-authorship of Dr. F. J. Seaver in "Contributions to the Mycoflora of Bermuda-IV" which will appear in "Mycologia" in 1946.

In addition to completing a fungous flora of Bermuda, the writer undertook the preparation of a second century of H. H. Whetzel's exsiccati set "Bermuda Fungi" (see Appendix, pp. 9-12), which was distributed to the herbaria of the following eleven institutions:

Department of Plant Pathology, Cornell University, Ithaca, N.Y.; New York Botanical Garden, N.Y.; Farlow Herbarium, Cambridge, Mass.; Division of Mycology and Disease Survey, Bureau of Plant Industry, U.S.D.A., Beltsville, Maryland; University of Michigan, Ann Arbor, Mich.; University of Iowa, Iowa City, Iowa; University of Wisconsin, Madison, Wis.; Missouri Botanical Garden, St. Louis, Mo.; Botany Department, University of Toronto, Canada; Royal Botanic Garden, Kew, England; Department of Botany, British Museum (Natural History), London, England.

Full advantage was taken during the writer's residence at Cornell University to obtain the latest information on fungicides, insecticides and weed-killers. Some of these appear promising, and deserve further trial in Bermuda.

INSPECTION SERVICES

Lily Inspection. The total acreage submitted to inspection was 5,490 square rods or a little over 34 acres. This was an increase of 10.6 acres over the area under lilies in the previous year. Of the total area, 20.5 or 60% were the early flowering type "Howardii." The area devoted to stock was 753 square rods.

Seed Inspection. The examination of vegetable seed and the testing of germination was an additional duty undertaken during the latter half of the year.

Inspection of Plant Importations. For the fourth year in succession, no live Japanese beetles, *Popillia japonica* Newm., were intercepted.

Live specimens, male and female, of an insect pest new to Bermuda, the spotted cucumber beetle, *Diabotrica duodecimpunctata* Fabr., were intercepted on a crate of lettuce imported from Oregon, U.S.A. on November 27th at No. 1 Shed, Hamilton. There is no evidence that this dangerous pest has become established locally.

Narcissus bulbs affected with the disease "smoulder" caused by the fungus *Botrytis narcissicola* Kleb., were intercepted in a shipment from Holland, December 10th. The disease has not been recorded in Bermuda.

Inspection of Plant Exportations. Many consignments of plants and bulbs were examined and certified as free from disease and pests prior to their being exported. The majority of these were Easter lily bulbs.

SPRAYING SERVICES

See report of 2nd Agricultural Assistant.

FUNGI AND INSECTS RECORDED

Arranged according to hosts.

* denotes a new record.

Brassica oleracea L., Cabbage, Cauliflower.

Heavy autumn rains favoured the spread of *Xanthomonas campestris* (Pamm.) Dowson, which caused considerable losses.

Citrus spp.

The "Donkey Beetle," *Diaprepes esuriens* Gyl., was commonly found attacking the foliage of grapefruit, oranges and lemons during October and November. No parasites of this pest are known in Bermuda.

Splitting of the fruit of Washington Navel oranges was seen in November as a result of heavy rains.

Stylar-end rot (non-parasitic) was seen for the first time on over-mature fruit of Meyer lemons, November 2nd, 1945. This form of wastage can be avoided by harvesting fruit before it has turned completely yellow.

An excellent response was observed in young trees of *Citrus* spp. receiving a nutritional spray containing copper, manganese and zinc sulphate in addition to standard fertiliser treatment of N.P.K. and copper sulphate.

* *Dendrocalamus strictus* Nees.

A fine fructification of *Polyporus graminicola* Murrill, was observed on a dead clump of this bamboo at the Agricultural Station, October 27th, 1945. This is a new substrate record.

Juniperus bermudiana L., Bermuda Cedar.

* *Diaspis visci* Schr. (*D. carueli* Targ.), Juniper scale, collected for the first time by W. R. Evans at "Chelston," Paget, August 27th, 1945, det. Dr. Harold Morrison. Parasitised by * *Aspidiotiphagus citrinus* Craw. (new host record for Bermuda).

* *Lepidosaphes newsteadi* Sulc., Oyster-shell scale, collected for the first time by T. A. Russell at Harrington Sound, December 4th, 1944. Det. Dr. Hall.

* *Paratetranychus ununguis* Jac., Spruce spider mite, common on foliage throughout the Islands and causing severe "blight" or browning of foliage in hot, dry weather. Det. Dr. E. W. Baker.

Lactuca sativa L., Lettuce

Live specimens of * *Diabotrica duodecimpunctata* F., were intercepted on crates of lettuce from Oregon, U.S.A., November 27th, 1945.

Lilium longiflorum var. *eximium* Baker, Bermuda Easter Lily.

Phytophthora parasitica Dastur, was early reported on variety "Howardii" by Mr. H. E. D. Smith, St. David's Island, October 29th, 1945. The disease caused losses ranging from 27-50% in some fields and was disseminated through the heavy rains washing soil into the young shoots as they emerged from the ground. The worst affected plants were found along the margins of the paths between the beds where surface "run-off" tended to collect. Spraying with Bordeaux proved an effective check.

* *Lycopersicon esculentum* Mill. Tomato.

Rhizoctonia solani Kühn, was observed on seedlings at the Agricultural Station, November 7th, 1945, an apparently new host record for Bermuda.

Cracking of fruit due to uneven water supply was prevalent on Valiant variety. Break o'Day showed very little injury.

Narcissus tazetta L.

* *Botrytis narcissicola* Kleb., was found for the first time on bulbs intercepted in parcel post from Holland, December 10th, 1945.

PUBLISHED WORK

The writer was joint author with J. W. Sinden and H. H. Whetzel of a paper entitled "Notes on the Geoglossaceae of Bermuda" published in Mycologia 37:32-36, 1945.

RECORD OF MOVEMENTS

I was absent from the Colony on Duty Leave in the United States of America over the period October 22nd, 1944 to October 21st, 1945, inclusive, with the purpose of completing a fungous flora of Bermuda at Cornell University, Ithaca, N.Y.

ACKNOWLEDGEMENTS

Acknowledgement is made to Dr. L. M. Massey, Head of the Department of Plant Pathology, Cornell University and to Dr. F. J. Seaver, Head Curator, New York Botanical Garden, for providing both laboratory and herbarium facilities in connection with the completion of the fungous flora, as well as to the Bureau of Entomology and Plant Quarantine, U.S.D.A., Washington, D.C., and the Imperial Institutes of Entomology and Mycology for aid in identifying insects and fungi. A special word of appreciation is due to the British Overseas Airways Corporation for their efficient handling of shipments of potato tuber moth parasites.

Respectfully submitted,

J. M. WATERSTON,

Plant Pathologist.

22nd January, 1946.

APPENDIX

H. H. Whetzel's exsiccati "Bermuda Fungi"

* denotes cotype material

First Century
Distributed November, 1943.

1. *Uredo sapotae* Arth. & Johnston, on *Sapota achras* Mill.
2. *Uredo nominata* Arth., on *Sisyrinchium bermudianum* L.
3. *Puccinia substriata* Ell. & Barth., on *Chaetochloa verticillata* (L.) Scribn.
4. *Tranzschelia punctata* (Pers.) Ath., on *Amygdalus persica* L.
5. *Cerotelium fici* (Cast.) Arth., on *Ficus carica* L.
6. *Uromyces striatus* Schroet., on *Merdicago lupulina* L.
7. *Coleosporium solidaginis* (Schw.) Thum., on *Solidago sempervirens* L.
8. *Puccinia lantanae* Farl., on *Lantana involucrata* L.
9. *Sorosporium syntherismae* (Pk.) Farl., on *Cenchrus tribuloides* L.
10. *Sphacelotheca pamparum* (Speg.) Clinton, on *Chaetochloa geniculata* (Lam.) Millsp. & Chase.
11. *Puccinia cichorii* (DC.) Bell., on *Cichorium intybus* L.
12. *Uromyces bidenticola* (P. Henn.) Arth., on *Bidens pilosa* L.
13. *Coleosporium ipomoeae* (Schw.) Burr., on *Ipomoea sagittata* Lam.
14. *Uromyces proeminens* (DC.) Pass., on *Euphorbia heterophylla* var. *cyathophora* (Murr.) Griseb.
15. *Uromyces proeminens* (DC.) Pass., on *Euphorbia preslii* Guss.
16. *Uromyces proeminens* (DC.) Pass., on *Euphorbia prostrata* Ait.
17. *Uromyces striatus* Schroet, on *Medicago hispida* Willd.
18. *Puccinia purpurea* Cooke, on *Sorghum halepensis* Pers.
19. *Puccinia cynodontis* DeLacroix, on *Capriola dactylon* (L.) Kuntze.
20. *Puccinia substriata* Ell. & Barth., on *Chaetochloa geniculata* (Lam.) Millsp. & Chase.
21. *Uromyces leptodermus* Syd., on *Panicum barbinode* Trin.
22. *Puccinia cladii* Ell. & Tracy, on *Mariscus jamaicensis* (Crantz.) Britton.
23. *Uromyces perigynius* Halsted, on *Carex albolutescens* Schw.
24. *Uromyces rhynchosporae* Ell., on *Rhynchospora distans* (Michx.) Vahl.
25. *Uredinopsis struthiopteridis* Stormer, on *Anchistea virginica* (L.) Presl.
26. *Cintractia montagnei* (Tul.) Magn., on *Rhynchospora distans* (Michx.) Vahl.
27. *Ustilaginoidea dichromenae* P. Henn., on *Dichromena colorata* (L.) Hitch.
28. *Uromyces scirpi* (Cast.) Burr., on *Scirpus americanus* Pers.
29. *Uromyces scirpi* (Cast.) Burr., on *Scirpus olneyi* A. Gray.
30. *Puccinia cladii* Ell. & Tracey, on *Mariscus jamaicensis* (Crantz.) Britton.
31. *Uredinopsis macrosperma* (Cooke) P. Magn., on *Pteris caudata* L.
32. *Puccinia superior* (Arth.) Jackson, on *Fimbristylis castanea* (Michx.) Vahl.
33. *Puccinia substriata* Ell. & Barth., on *Chaetochloa geniculata* (Lam.) Millsp. & Chase.
34. *Puccinia tubulosa* (Pat. & Gaill.) Arth., on *Oplismenus hirtellus* (L.) R. & S.
35. *Uredo parthenii* Speg., on *Parthenium hysterophorus* L.
36. *Puccinia cannae* (Wint.) P. Henn., on *Canna indica* L.
37. *Uromyces limonii* (DC.) Lév., on *Limonium carolinianum* (Walt.) Britton.
38. *Ustilago affinis* Ell. & Ev., on *Stenotaphrum secundatum* (Walt.) Kuntze.
39. *Puccinia polygoni-amphibii* Pers., on *Persicaria punctata* (Ell.) Small.
40. *Puccinia hydrocotyles* (Link) Cooke, on *Hydrocotyle verticillata* Thunb.
41. *Uromyces limonii* (DC.) Lév., on *Limonium carolinianum* (Walt.) Britton.
42. *Puccinia cannae* (Wint.) P. Henn., on *Canna glauca* L.
43. *Puccinia triannulata* (B. & C.) Jackson, on *Borrichia arborescens* (L.) DC.
44. *Puccinia triannulata* (B. & C.) Jackson, on *Borrichia arborescens* (L.) DC.
45. *Uromyces scirpi* (Cast.) Burr., on *Scirpus olneyi* A. Gray.
46. *Puccinia dichondrae* Mont., on *Dichondra carolinensis* Michx.
47. *Puccinia purpurea* Cooke, on *Sorghum halepensis* Pers.
48. *Puccinia levis* (Sacc. & Bizz.) Magn., on *Paspalum* sp.
49. *Puccinia dichromenae* (Arth.) Jackson, on *Dichromena colorata* (L.) Hitch.

50. *Puccinia cenchri* Diet. & Holw., on *Cenchrus echinatus* L.
51. *Puccinia menthae* Pers., on *Mentha* sp.
52. *Uromyces howei* Peck, on *Asclepias curassavica* L.
53. *Prospodium appendiculatum* (Wint.) Arth., on *Tecoma stans* (L.) Juss.
54. *Puccinia triannulata* (B. & C.) Jackson, on *Borrichia frutescens* (L.) DC.
55. *Ravenelia indigoferae* Tranz., on *Indigofera suffruticosa* Mill.
56. *Uromyces limonii* (DC.) Lév., on *Limonium carolinianum* (Walt.) Britton.
57. *Puccinia tubulosa* (Pat. & Gaill.) Arth., on *Oplismenus hirtellus* (L.) R. & S.
58. *Entyloma fuscum* Schroet., on *Papaver rhoeas* L.
59. *Entyloma meliloti* McAlpine, on *Melilotus indica* (L.) All.
60. *Gymnosporangium bermudianum* (Farl.) Earle, on *Juniperus bermudiana* L.
61. *Cintractia montagnei* (Tul.) Magn., on *Rhynchospora stipitata* Chapm.
62. *Uromyces caryophyllinus* (Schrank) Wint., on *Dianthus chinensis* L.
63. *Puccinia coronata* Corda, on *Avena sativa* L.
64. *Uredinopsis osmundae* Magn., on *Osmunda cinnamomea* L.
65. *Uredinopsis macrosperma* (Cooke) P. Magn., on *Pteridium caudatum* (L.) Maxon.
66. *Uromyces striatus* Schroet., on *Medicago hispida* Willd.
67. *Puccinia antirrhini* Diet. & Holw., on *Antirrhinum majus* L.
68. *Puccinia triannulata* (Berk. & Curt.) Jackson, on *Borrichia arborescens* (L.) DC.
69. *Puccinia cannae* (Wint.) P. Henn., on *Canna indica* L.
70. *Uromyces caryophyllinus* (Schrank.) Wint., on *Dianthus chinensis* L.
71. *Puccinia dichromenae* (Arth.) Jackson, on *Dichromena colorata* (L.) Hitch.
72. *Ustilago levis* (Kell. & Swingle) Magn., on *Avena sativa* L.
73. *Calonectria erubescens* (Rob.) Sacc., on *Sabal bermudana* Bailey.
74. *Nectria peziza* (Tode) Fr., on *Sabal bermudana* Bailey.
75. *Rosellinia breensis* Starb., on rotten stick.
76. *Eutypella sabalina* (Cke.) Ell. & Ev., on *Sabal bermudana* Bailey.
77. *Diatrypella verruciformis* (Ehr.) Nits., on *Crescentia cujete* L.
*78. *Anthostomella rhizophorae* Vizioli, on *Rhizophora mangle* L.
79. *Anthostomella minor* Ell. & Ev., on *Sabal bermudana* Bailey.
80. *Diatrypella verruciformis* (Ehrh.) Nits., on wood.
81. *Diatrypella verruciformis* (Ehrh.) Nits., on *Myrica cerifera* L.
82. *Hypoxylon rubiginosum* (Pers.) Fr., on dead sticks.
83. *Ophionectria cylindrothecia* Seaver, on *Sabal bermudana* L.
84. *Hypoxylon effusum* Nitsc., on *Melia azedarach* L.
85. *Puccinia coronata* Corda, on *Avena sativa* L.
86. *Uredinopsis copelandi* Syd., on *Dryopteris thelypteris* (L.) Gray.
87. *Uromyces phaseoli* (Pers.) Wint., on *Dolichos lablab* L.
88. *Kuehneola uredinis* (Link.) Arth., on *Rubus trivialis* Michx.
89. *Puccinia helianthi* Schw., on *Helianthus annuus* L.
90. *Puccinia tubulosa* (Pat. & Gail.) Arth., on *Oplismenus hirtellus* (L.) R. & S.
91. *Cerotelium desmium* (B. & Br.) Arth., on *Gossypium herbaceum* L.
92. *Uromyces howei* Peck, on *Ascelpias curassavica* L.
93. *Uromyces howei* Peck, on *Asclepias curassavica* L.
94. *Uredo nominata* Arth., on *Sisyrinchium bermudianum* L.
95. *Uredo sapotae* Arth. & Johnston, on *Sapota achras* Mill.
96. *Sphacelotheca pamparum* (Speg.) Clinton, on *Chaetochloa geniculata* (Lam.) Millsp. & Chase.
97. *Puccinia lantanae* Farl., on *Lantana involucrata* L.
98. *Puccinia substriata* Ell. & Barth., on *Chaetochloa geniculata* (Lam.) Millsp. & Chase.
99. *Puccinia coronata* Corda, on *Avena sativa* L.
100. *Uromyces fabae* (Pers.) de Bary, on *Vicia faba* L.

Second Century
Distributed September. 1945.

101. *Diplodia palmicola* Thum., on *Sabal bermudana* Bailey.
102. *Melanconium fructicolum* Petch, on *Punica granatum* L.
103. *Solenia candida* Pers., on *Sabal bermudana* Bailey.
104. *Alternaria solani* (Ell. & Mart.) Jones & Grout, on *Solanum tuberosum* L.

105. *Rosellinia rhacidis* Pat., on *Sabal bermudana* Bailey.
106. *Rosellinia diderma* (Schw.) Ell. & Ev., on fallen petioles of some palm.
107. *Gloeosporium papayae* P. Henn., on *Carica papaya* L.
108. *Phoma herbarum* West., on *Ricinus communis* L.
109. *Poronia oedipus* Mont., on Cow dung.
110. *Eutypella sabalina* (Cke.) Ell. & Ev., on *Sabal bermudana* Bailey.
111. *Hypoxylon serpens* P. ex Fr., on *Myrica cerifera* L.
112. *Anthostomella minor* Ell. & Ev., on *Sabal bermudana* Bailey.
*113. *Eutypllea linearis* Vizioli, on *Bambusa vulgaris* Schrad.
114. *Hypoxylon howeianum* Peck, on *Prunus persica* (L.) Batsch.
115. *Hypoxylon serpens* P. ex Fr., on *Prunus persica* (L.) Batsch.
116. *Phytophthora parasitica* Dast., on *Bryophyllum pinnatum* (Lam.) Kurz.
117. *Cercospora lippiae* Ell. & Ev., on *Lippia nodiflora* (L.) Michx.
118. *Phyllosticta batatas* (Thum.) Cooke, on *Ipomoea batatas* (L.) Poir.
119. *Ptychogaster cubensis* Pat., on *Myrica cerifera* L.
120. *Cercospora ipomoeae* Wint., on *Ipomoea villosa* R. & P.
121. *Cercospora ipomoeae* Wint., on *Ipomoea pes-caprae* (L.) Roth.
122. *Cercospora stachytarphetae* Ell. & Ev., on *Valerianodes jamaicensis* (L.) Kuntze.
123. *Lamprospora planchonis* (Dun.) Seaver, on sand dunes.
124. *Pithya cupressi* (Batsch) Rehm., on *Juniperus bermudiana* L.
125. *Cercospora punicae* P. Henn., on *Punica granatum* L.
126. *Melomastia mastoidea* (Fr.) Schrot., on *Lantana involucrata* L.
127. *Macrophoma oleandri* Passer., on *Nerium oleander* L.
*128. *Endothia coccolobii* Vizioli, on *Coccolobis uvifera* (L.) Jacq.
129. *Geoglossum nigritum* Cke., on Mossy Hill-sides.
130. *Meliola circinans* Earle, on *Mariscus jamaicensis* (Crantz.) Britton.
131. *Meliola cookeana* Speg., on *Lippia nodiflora* (L.) Michx.
132. *Cercospora ricinella* Sacc. & Berl., on *Ricinus communis* L.
133. *Pseudopithyella minuscula* (Boud. & Torrend.) Seaver, on *Juniperus bermudiana* L.
134. *Sclerotinia sclerotiorum* (Lib.) de Bary, on lettuce beds.
135. *Polystictus pinsitus* Fr., on *Juniperus bermudiana* L.
136. *Cercospora kaki* Ell. & Ev., on *Diospyros kaki* L.
137. *Phyllosticta concava* Seaver, on *Opuntia dillenii* (Ker.) Haw.
138. *Xylaria aristata* Mont., on *Jasminum gracile* Andrews.
139. *Cercospora lantanae* Chupp, on *Lantana camara* L.
140. *Cercospora beticola* Sacc., on *Beta vulgaris* L. var. *cicla* L.
141. *Septoria oleandrina* Sacc., on *Nerium oleander* L.
142. *Septoria apii-graveolentis* Dorogin, on *Apium graveolens* L.
143. *Septoria lycopersici* Speg., on *Lycopersicon esculentum* Mill.
144. *Diatrypella verruciformis* (Ehr.) Nits., var. *spegazziniana* Sacc., on *Poinciana regia* Bojer.
145. *Penzigia bermudensis* Miller, on fallen sticks.
146. *Darluca filum*(Fr.) Cast., on *Uromyces rhynchosporae* Ell., on *Rhynchospora distans*(Michx.) Vahl.
147. *Erysiphe polygoni* DC., on *Pisum sativum* L.
148. *Darluca filum* (Fr.) Cast., on *Puccinia cannae* (Wint.) P. Henn., on *Canna indica* L.
149. *Septoria petroselini* Desm., on *Apium petroselinum* L.
150. *Physarum bogoriense* Racib., on old leaves.
151. *Craterium leucocephalum* Ditm., on *Sabal bermudana* Bailey.
152. *Physarum melleum* Mass., on *Lonicera japonica* Thumb. & *Musa cavendishii* Lamb.
153. *Diderma spumarioides* Fries, on old leaves and sticks.
154. *Trichia persimilis* Karst, on *Sabal bermudana* Bailey.
155. *Diachea leucopoda* Rost., on *Musa cavendishii* Lamb.
156. *Physarum compressum* Alb. & Schw., on *Carica papaya* L.
157. *Diplocarpon rosae* (Fr.) Wolf, on *Rosa* sp.
158. *Elsinoe fawcettii* Bitancourt & Jenkins, on *Citrus* sp.
159. *Cystopus ipomoeae-panduranae* (Schw.) Stev. & Swingle, on *Ipomoea nil* (L.) Rath.
160. *Peronospora lamii* A. Braun, on *Lamium amplexicaule* L.
161. *Cystopus candidus* (Pers.) Lév., on *Cakile lanceolata* (Willd.) O. E. Schulz.
162. *Cystopus candidus* (Pers.) Lév., on *Brassca nigra* (L.) Koch.

163. *Plasmopara geranii* (Peck) Berl. & De Toni, on *Geranium carolineanum* L.
164. *Plasmopara geranii* (Peck) Berl. & De Toni, on *Geranium carolineanum* L.
165. *Peronospora parasitica* (Pers.) de Bary, on *Raphanus raphanistrum* L.
166. *Cystopus ipomoeae-panduranae* (Schw.) Stev. & Swingle, on *Ipomoea batatas* (L.) Lam.
167. *Cystopus candidus* (Pers.) Lév., on *Erysimum officinale* L.
168. *Cystopus candidus* (Pers.) Lév., on *Brassica nigra* (L.) Koch.
169. *Cystopus candidus* (Pers.) Lév., on *Raphanus raphanistrum* L.
170. *Cystopus cubicus* (Strauss. ex Unger) Lév., on *Tragopogon porrifolius* L.
171. *Meliola cookeana* Speg., on *Lippia nodiflora* (L) Michx.
172. *Dimeriella melioloides* (Berk. & Curt.) Theiss., on *Baccharis glomeruliflora* Pers.
173. *Polystictus hirsutus* Fr., on *Psychotria ligustrifolia* (Northrop) Millsp.
174. *Septoria oleandrina* Sacc., on *Nerium oleander* L.
175. *Xanthomonas phaseoli* (E. F. S.) Dowson, on *Phaseolus vulgaris* L.
176. *Botrytis cinerea* Pers., on *Rosa* sp. (Buds).
177. *Trichothecium helminthosporii*(Thum.)Sacc., on *Helminthosporium ravenelii* Berk & Curt.
178. *Helminthosporium ravenelii* Berk. & Curt., on *Sporobolus berteroanus*(Trin.)Hitch & Chase.
179. *Asperisporium caricae* (Speg.) Maubl., on *Carica papaya* L.
180. *Botrytis elliptica* (Berk.) Cooke, on *Lilium longiflorum* var. *eximium* Baker.
181. *Auricularia polytricha* Mont., on *Ficus elastica* Roxb.
182. *Macrophoma coffeae* (Del.) Sacc. & Syd., on *Coffea arabica* L.
183. *Capnodium mangiferum* Cke.&Br., on honeydew of *Ceroplastes floridensis* & *Eucalymnatus tessellatus*, on *Mangifera indica* L.
184. *Dimeriella melioloides* (Berk. & Curt.) Theiss, on *Baccharis glomeruliflora* Pers.
185. *Scleroderma bermudense* Coker, on sand dunes.
186. *Hydnum alutaceum* Fr., on *Sabal bermudana* Bailey.
187. *Peniophora pertenuis* (Karsten) Burt., on *Sabal bermudana* Bailey.
188. *Bulgaria melastoma* (Sow.) Seaver, on *Juniperus bermudiana* L.
189. *Graphiola phoenicis* (Moug.) Poir., on *Phoenix dactylifera* L.
190. *Oidium curtisii* (Berk.) Linder, on *Sabal bermudana* Bailey.
191. *Hypoxylon serpens* P. ex Fr., on *Persea gratissima* Gaertn.
192. *Polystictus pinsitus* Fr., on *Juniperus bermudiana* L.
193. *Poronia leporina* Ell. & Ev., on Rabbit dung.
194. *Ustilago avenae* (Pers.) Jens., on *Avena sativa* L.
195. *Peronospora manshurica* (Naoum.) Syd., on *Glycine max* (L.) Merr.
196. *Phyllosticta batatas* (Thum.) Cooke, on *Ipomoea batatas* (L.) Poir.
197. *Puccinia purpurea* Cooke, on *Sorghum vulgare* Pers.
198. *Cystopus candidus* (Pers.) Lév., on *Iberis umbellata* L.
199. *Septoria rosae* Desm., on *Rosa* sp.
200. *Exosporium leucaenae* Stevens & Dalbey, on *Leucaena glauca* (L.) Benth.